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C-51-7-5-89

July 26, 1995

Project Number 1412

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Northern Division
Environmental Contracts Branch, Mailstop No. 82
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Reference: CLEAN Contract No. N62472-90-D-1298
Contract Task Order (CTO) No. 159

Subject: Proposed Subsurface Soil Investigation for Area B
Phase III Remedial Investigation/Feasibility Study (RI/FS)
Naval Air Warfare Center (NAWC) Warminster, Pennsylvania

Dear Mr. Monaco:

This letter addresses the proposed subsurface soil investigation for Area B (Sites 5, 6, and 7) at NAWC Warminster as part of Phase III RI activities. Halliburton NUS Corporation (HNUS) has reviewed the results of previous investigations at Area B to formulate this approach. These investigations included geophysical surveys, soil gas sampling, and surface soil sampling. The geophysical survey results were provided under separate cover (dated April 19, 1995 and May 22, 1995). The soil gas and surface soil sample results for Area B are shown in the attachments to this letter. Significant findings and the proposed subsurface soil sampling approach for each site are described below. The proposed approach differs somewhat from the Phase III RI work plan dated January 1995.

Site 5

Significant soil gas results (Attachment I) are as follows:

- No clear pattern of subsurface contamination was identified based on the soil gas results.
- A few scattered positive soil gas detections were found within Site 5. Chemicals detected include BTEX, PCE, and TCE. Only one sample location showed the presence of PCE (0.3J ppb) or TCE (0.09J ppb).
- BTEX compounds were detected at four soil gas locations at concentrations ranging from 1.7 to 3.6 ppb.

Previous soil gas work indicated that VOCs in subsurface soils were present north and west of Building 401. A total of 10 confirmation borings were drilled during the Phase I RI. Five borings encountered waste, and the remaining borings found non-native clean fill or native soil. The average thickness of waste material at Site 5 was 4 to 5 feet. The average thickness of non-native clean fill was 5 to 6 feet.

During Phase II, three subsurface soil samples were collected from the western half of Site 5 near Building 401. Some metal concentrations (barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, silver, and zinc) exceeded representative background concentrations, primarily from boring SB-6 west of Building 401. Several PAHs and PCBs were detected in SB-6. Aroclor 1248 was detected at 315 ppb; Aroclor 1254 was found at 395 ppb.

During the Area B hydrogeologic investigation, 11 soil boring samples were collected at well cluster locations. No pattern of organic or metallic contamination was observed in the soils at Area B based on these results (see draft Area B hydrogeologic report dated April 1995).

During Phase III, 11 surface soil samples were taken in the vicinity of Site 5. The validated results are provided in Attachment II. Low levels of TCE (ranging from 5J to 33 ppb) were found in about half of these samples. The highest TCE concentrations were from the eastern end of EPIC feature TR5, south of Building 403.

Aroclor 1254 was detected at five surface soil sample locations at levels ranging from 43J to 24,000 ppb. The highest concentration was found within TR5. This location corresponds to the highest endrin concentration of 810J ppb. All other pesticide results were less than 8 ppb. Only two Site 5 soil samples (including one duplicate sample) detected more than three semivolatile organic compounds. The highest semivolatile organic concentration was for chrysene (450 ppb).

Elevated levels of copper, lead, manganese, nickel, and zinc were detected at Site 5 in surface soils based on comparisons to the highest background soil concentrations. For these metals, Site 5 soil concentrations exceeded background levels by a factor of 3. The background samples were taken from both ends of the main runway at the base. The highest results were as follows:

- Copper - 875 ppm (background is 12 ppm)
- Lead - 496 ppm (background is 13 ppm)
- Manganese - 1,390 ppm (background is 573 ppm)
- Nickel - 83 ppm (background is 15 ppm)
- Zinc - 895 ppm (background is 50 ppm)

Except for lead and manganese, the highest metal concentrations were from the middle and eastern ends of TR5. The highest manganese concentration was from the eastern end of TR3 near Building 402, and the highest lead concentration was from the western end of TR3. As such, no consistent pattern of inorganic soil contamination was identified at Site 5.

Attachment III shows the proposed subsurface soil boring locations for Site 5. Test pits will not be excavated within Site 5 due to the presence of numerous buried utilities. A total of nine borings are planned for this area, including

- Two borings in the vicinity of confirmation boring S5-1, which was drilled by SMC Martin as part of Phase I RI activities. VOC vapors were found from 3 to 6 feet below the ground surface in this boring at a concentration of 1 to 10 ppm.

- Three borings between Buildings 401 and 403 that correspond to the Aroclor 1254, endrin, and elevated metal concentrations in surface soil. These borings will be distributed within TR5.

- Two borings within TR3 that correspond to elevated metal concentrations (copper, lead, zinc, manganese) in surface soil.

- One boring south of Building 401 that corresponds to BTEX soil gas detections. This boring will be near confirmation boring S5-5, which was drilled by SMC Martin. VOC vapors were found from 8 to 10 feet below the ground surface at a concentration between 1 to 15 ppm. This boring was from an area of clean fill, according to SMC Martin's visual observations.

- One boring south of Building 401 that corresponds to a PCE soil gas detection.

Two samples will be obtained from each boring within Site 5. Soil boring samples will be selected for analysis based on field screening for organics and visible evidence of potential contamination. If no evidence of potential contamination is found, samples will be taken from directly above the deepest depth of fill materials (if present) or the bottom of the boring and from half the distance up from this sample depth to the ground surface.

All samples will be analyzed for TCL volatile organics, pesticides/PCBs, and TAL metals. Samples from TR5 will also be analyzed for TCL semivolatile organics. Other samples will be analyzed for this parameter if the samples appear to be potentially contaminated, based on visual observations and photoionization detector (PID) readings.

Site 6

Significant soil gas results (Attachment 4) are as follows:

- Several small areas of positive soil gas detections were found near and within Site 6.

- An area of elevated VOCs within Site 6 exists upgradient of Wells DG-9 and DG-18 and south of EPIC feature TR4. Chemicals detected include PCE, TCE, and cis-1,2-DCE. The highest TCE concentration was 97 ppb; for PCE, 24 ppb; and for cis-1,2-DCE, 26 ppb. This area corresponds to an in-phase electromagnetic (EM) anomaly but does not correspond to an EPIC feature. The area is about 35 by 50 feet in size.

- Within Site 6, BTEX compounds were detected in soil gas samples from several probable trenches (i.e., TR11, TR12, TR6B, TR6D, and TR6E). The BTEX concentrations were not significantly high (i.e., greater than 7 ppb).

- Within Site 6, elevated VOCs were detected in a few soil gas samples from TR11, TR12, and TR6B. These chemicals were not consistently found in any one trench. Chemicals detected included PCE, TCE, carbon tetrachloride, 1,1,1-TCA, cis-1,2-DCE, and 1,1-DCA.

- BTEX compounds and VOCs were also found within an area of irregular weak to moderate EM anomalies. 1,1-DCA was found at 63 ppb from one sample location in this area.

Previous soil gas work indicated that VOC vapors in subsurface soils were present in the western half of Site 6. The largest area of VOC detections corresponds to TR4. A total of six test pits were excavated during the Phase I RI. Five pits encountered clean fill and general construction debris, including glass, cement, electrical components, scrap metal, and asphalt. VOC vapors were only detected from the test pit within TR13. The average thickness of waste/fill material at Site 6 may be up to 10 feet, according to SMC Martin.

During the Phase II RI, three subsurface soil samples were collected from the western half of Site 6 and one sample was taken north of Site 6. Several PAHs were detected in SB-9 (located in the northwestern corner of Site 6). Except for carbon disulfide, no other organics were found from the Site 6 samples.

During Phase III, 20 surface soil samples were taken in the vicinity of Site 6. The validated results are provided in Attachment V. Low levels of TCE (ranging from 1J to 32 ppb) were found in half of these samples. The highest TCE concentration was from the area of elevated VOC vapors upgradient of Wells DG-9 and DG-18 and south of EPIC feature TR4. PCE was also detected in this area at levels between 2J and 8J ppb. Low levels (ranging from 1J to 15J ppb) of toluene were found in more than half of the surface soil samples taken from Site 6.

Four pesticides were detected at Site 6, including DDT, DDD, alpha-chlordane, and endrin. Endrin (14J ppb) and alpha-chlordane (8.2 ppb) were only found in soil samples from TR4. Aroclor 1254 was detected at 490 ppb from one soil sample within the area of weak to moderate EM anomalies. No other pesticides were found at Site 6. Only a few Site 6 samples detected any semivolatile organic compounds. The highest semivolatile organic concentration was for fluoranthene (95J ppb).

Elevated levels of chromium, copper, lead, manganese, and zinc were detected at Site 6 in surface soils based on comparisons to the highest background soil concentrations. For these metals, Site 6 soil concentrations exceeded background levels by a factor of 3. The highest results were as follows:

- Chromium - 414 ppm (background is 27 ppm).
- Copper - 316 ppm (background is 12 ppm).
- Lead - 634 ppm (background is 13 ppm).
- Manganese - 3,040 ppm (background is 573 ppm). This concentration was from TR13.
- Zinc - 360K ppm (background is 50 ppm).

No consistent pattern of inorganic soil contamination was identified at Site 6. The highest chromium detection was from TR4. Samples collected from within TR12 did not show elevated metal concentrations. The highest barium, copper, and zinc concentrations were found at the same location where Aroclor 1254 was detected at 490 ppb.

Attachment VI shows the proposed test pit locations for Site 6. A total of eight test pits are planned for this area, including

- Two test pits within the area of elevated VOCs upgradient of Wells DG-9 and DG-18.
- Two test pits along EPIC feature TR11.
- Two test pits along EPIC feature TR12.
- One test pit within the area of weak to moderate EM anomalies where 1,1-DCA was detected in a soil gas sample and where Aroclor 1254 was found in a surface soil sample.
- One test pit within EPIC feature TR13. No EM or soil gas anomalies were detected in this area during Phase III. During Phase I, SMC Martin detected a small amount of VOC vapors (0.1 ppm) from a test pit in this area.

Two samples per pit will be taken for analysis. A shallow bedrock well will be installed within Site 6 if an area of significant contaminated subsurface soils is found based on the test pit samples. If no evidence of contamination is found, a shallow well will be installed upgradient of the area showing elevated VOCs

near wells DG-9 and DG18. Test pit samples will be selected for analysis based on field screening for organics and visible evidence of potential contamination. If no evidence of potential contamination is found, samples will be taken from directly above the deepest depth of fill materials (if present) or the base of the test pit and from half the distance up from this sample depth to the ground surface.

All samples will be analyzed for TCL volatile organics and TAL metals. Some test pit samples will be analyzed for TCL semivolatile organics and PCBs, based on the surface soil results for that particular location. These analyses will be performed for other samples if the samples appear to be potentially contaminated, based on visual observations and PID readings.

Each test pit will be excavated with a backhoe and will be approximately 3 to 6 feet wide. The lengths of each pit will vary by location and will be based upon the lateral extent of the anomaly that is being investigated and on the subsurface conditions encountered. The depth of each pit will be to the maximum depth of wastes or fill material encountered. If no wastes/fill material are encountered, the pits will be excavated to the top of bedrock, to the water table, or to the maximum reach of the backhoe, whichever is encountered first. Subsurface samples will be selected based on field observations and will be obtained from the excavated material in the backhoe bucket.

Excavation work will proceed at a normal rate unless PID readings greater than 60 ppm are obtained. If readings greater than 60 ppm, but less than 100 ppm, are reached, excavation work will proceed more slowly. Upon completion, each test pit will be backfilled with the excavated material.

PID readings greater than 100 ppm will require HNUS to containerize the contaminated subsurface soils or wastes after collecting the appropriate samples. Remaining excavation work at that test pit location will be suspended and clean fill will be used to replace the removed soils/wastes.

Site 7

No positive soil gas readings (Attachment VII) were detected from the vicinity of Site 7 during Phase III. A total of 14 confirmation borings and three test pits were drilled or excavated during Phase I and were located in areas where both EM and soil gas surveys had indicated anomalous readings. No wastes, sludges, or significant fill materials were found. Also, no VOC vapors were detected in any of the soils removed from the test pits. The Phase III EM survey at Site 7 did not encounter any anomalies.

During Phase III, 10 surface soil samples were taken in the vicinity of Site 7. The validated results are provided in Attachment VIII. Low levels of TCE (ranging from 3J to 34 ppb) were found in every Site 7 sample except one. The highest TCE concentration was from the eastern end of TR6 upgradient of Well HN-38. PCE (2J ppb) and toluene (1J ppb) were also detected at this sample location.

No pesticides, semivolatile organics, PCBs, or elevated metal concentrations were found at Site 7.

Since no waste materials were detected during previous work at Site 7, HNUS plans to excavate only two test pits in the vicinity of TR6 and two test pits in the vicinity of the possible fill area (Attachment 9). These pits will be located to correspond to those surface soil locations where TCE was found. Two samples per pit will be taken for analysis.

Test pit samples will be selected for analysis based on field screening for organics and visible evidence of potential contamination. If no evidence of potential contamination is found, samples will be taken from directly above the deepest depth of fill materials (if present) or the base of the test pit and from half the distance up from this sample depth to the ground surface.

All samples will be analyzed for TCL volatile organics. Optional analyses include TAL metals, TCL semivolatile organics, and PCBs. These analyses will only be performed if the samples appear to be potentially contaminated, based on visual observations and PID readings.

Each test pit will be excavated with a backhoe and will be approximately 3 to 6 feet wide. The lengths of each pit will vary by location and on the subsurface conditions encountered. The depth of each pit will be to the maximum depth of wastes or fill material encountered. If no wastes/fill material are encountered, the pits will be excavated to the top of bedrock, to the water table, or to the maximum reach of the backhoe, whichever is encountered first. Subsurface soil and waste samples will be selected based on field observations and will be obtained from the excavated material in the backhoe bucket.

Copies of this letter are being provided to NAWC Warminster, United States Environmental Protection Agency (EPA), and Pennsylvania Department of Environmental Protection (PADEP) officials. HNUS anticipates this work will begin on July 31, 1995.

Please contact Jeff Orient or me if you have any questions or comments.

Sincerely,

Neil Teamerson

Neil Teamerson
Phase III RI Coordinator

ANT/dhd

Attachments

c: Raymond Mannella (NAVFACENGCOM)
Thomas Ames (NAWC Warminster)
Kathryn Davies (EPA Region III)
Darius Ostrauskas (EPA Region III)
David Kennedy (PADEP)
Jeffrey Orient (Halliburton NUS)
Michael Turco (Halliburton NUS) (without attachments)